CHAPTER III
MATERIALS AND METHODS

3.1 Location and Time

The research was conducted from November 2017 to January 2018. The process of making fermented goat *dendeng* was conducted at egg laboratory, Animal Product Technology Department, Faculty of Animal Science, Brawijaya University. The analysis of Total of Lactic Acid Bacteria (LAB), pH, and propagation of *Lactobacillus plantarum* was conducted in the microbiology laboratory Animal Product Technology Department, Faculty f Animal Science, Brawijaya University. The analysis of Texture, L*a*b* Color Scale, and Total Titratable Acidity (TTA) was conducted at Food Technology and Agriculture Product Laboratory, Food Technology and Agriculture Product Department, Faculty of Food Technology, Gajah Mada University.

3.2 Material and Equipments

3.2.1 Material ingredient (dendeng)

The main ingredients used in this research is goat meat muscle (Biceps femoris) species of *kambing kacang* (*Capra hircus*) aged around one until two years old. Goat meat used in this research was purchased from Kebalen Traditional Market, Zaenal Zakse street, Malang. Furthermore, the grinding process was done in Tawangmangu Traditional Market at Tawangmangu Road, Lowokwaru district, Malang. The starter used is *Lactobacillus plantarum* FNCC 0027 bacteria which get from Microbiology Laboratory Center for Food and Nutrition Studies of Gadjah Mada University Yogyakarta. The

other ingredients are used such as brown sugar, salt, garlic, coriander, pepper, galangal, and cumin.

3.2.2 Material of variables analysis

The starter was propagated on the media de Man Rogosa Sharp *Agar* (MRS-A), de Man Rogosa Sharp *Broth* (MRS-B), skimmed milk, and sugar. Chemicals compound that used include aquadest, NaOH 0.1N, phenolphthalein indicators, buffer with pH 4 and 7.

3.2.3 Equipment dendeng production

The equipment that used for making fermented goat *dendeng* were *dendeng* mold (thick glass 3 (three) milimeters, plastic gloves food grade aluminium foil, bread paper, analytical scale with accuracy 0.01 gram, spoon, solet, basin, oven.

3.2.4 Equipment variables analysis

Equipment for propagation of *Lactobacillus plantarum* FNCC 0027 was erlenmeyer 200 ml, petri dish, reaction tube with the rack, incubator, autoclave, ose wire, and pippete. Equipment for analysis is pH meter to analyze pH, autoclave, incubator, thermometer , micro-pipet, spatula, aluminum foil, Bunsen, Erlenmeyer, measuring cup, petri dish, beaker, buret, cotton, mattress yarn, digital scales, Universal Testing Machine (UTM) for texture analysis, Chromatometer and Whatman filter paper no. 3 for L*a*b* color scale analysis.

3.3 Method

The research was conducted by Experimental Method design by Completely Randomized Design (CRD) consist of 4

(four) treatments and 4 (four) replications. The treatment used was:

T_0: *Dendeng* without starter *Lactobacillus plantarum*

T_1: *Dendeng* with starter *Lactobacillus plantarum* 0.3 mL

T_2: *Dendeng* with starter *Lactobacillus plantarum* 3 mL

T_3: *Dendeng* with starter *Lactobacillus plantarum* 30 mL

Table 2. Tabulation Model of the Research Data

Treatment	Replication			
	U_1	U_2	U_3	U_4
T_0	T_0U_1	T_0U_2	T_0U_3	T_0U_4
T_1	T_1U_1	T_1U_2	T_1U_3	T_1U_4
T_2	T_2U_1	T_2U_2	T_2U_3	T_2U_4
T_3	T_3U_1	T_3U_2	T_3U_3	T_2U_4

The formulation fermented goat meat *dendeng* with *Lactobacillus plantarum* can be seen on Table 3.

Table 3. Ingredients and Composition of Fermented Goat Meat *Dendeng*

Ingredients	Total			
	T_0	T_1	T_2	T_3
Goat meat	150 g	150 g	150 g	150 g
Lactobacillus plantarum	0	0.3 mL	3 mL	30 mL
Salt	3 g	3 g	3 g	3 g
Brown sugar	25 g	25 g	25 g	25 g
Garlic	7.5 g	7.5 g	7.5 g	7.5 g
Calangal	1 g	1 g	1 g	1 g
Cumin	0.25 g	0.25 g	0.25 g	0.25 g
Pepper	0.5 g	0.5 g	0.5 g	0.5 g
Coriander	2 g	2 g	2 g	2 g

3.3.1 Research Procedure

3.3.1.1 Procedure of goat meat *dendeng* making

Goat meat muscle (Biceps femoris) was purchased milled it. Weighed the spices and then smoothed. Mix the meat with spices, stirred it until evenly distributed. Divided the dough into 4 (four) according to the amount of treatment. Kemuadian inoculated with starter Lactobacillus plantarum according to the treatment used is 0 mL, 0.3 mL, 3 mL, and 30 mL. The dough is stored in a baking sheet and sealed tightly with plastic wrap. Incubated for 24 hours at 37 degrees Celsius. Mold the dough using glass with a thickness of 3 mm. Then dried with temperature 40-degree Celsius for 9 hours. Wait for 15 minutes before packed and labeled. This process can be seen on Figure 2. The analysis was conducted at the age 3 to 7 days of fermentation.

3.3.1.2 Propagation of *Lactobacillus plantarum*

The process of making starter culture by using propagation method. Propagation is the process of dissemination and removal of culture to obtain the sufficient amount of microbes (Madawa, Lindawati, and Tatang, 2006). The process of propagation *Lactobacillus plantarum* were inoculated pure culture as much 1 (one) ose wire into *deMan Rogosa Sharp* Agar (MRS-A), then incubated at 37℃ for 48 hours and ready for use as working cultures to make starter. The remainder was stored at -4℃ as culture stock. *deMan Rogosa Sharp Broth*(MRS-B) sterile as much as 5ml inoculated with working culture as much as 1 (one) ose wire the incubated at 37℃ for 48 hours to obtain the liquid culture. The liquid culture inoculates as much as 1% into a 50 ml skimmed milk which was sterile and incubated at 37℃ for 24 hours to obtain the parent starter. The bulk starter was prepared by 1% parent starter inoculated with skimmed mil 50

ml and glucose or sugar 3 grams for 24 hours at the temperature 37℃ for 48 hours with SPC (Standard Plate Count) method. The flowchart could be seen on Figure 3.

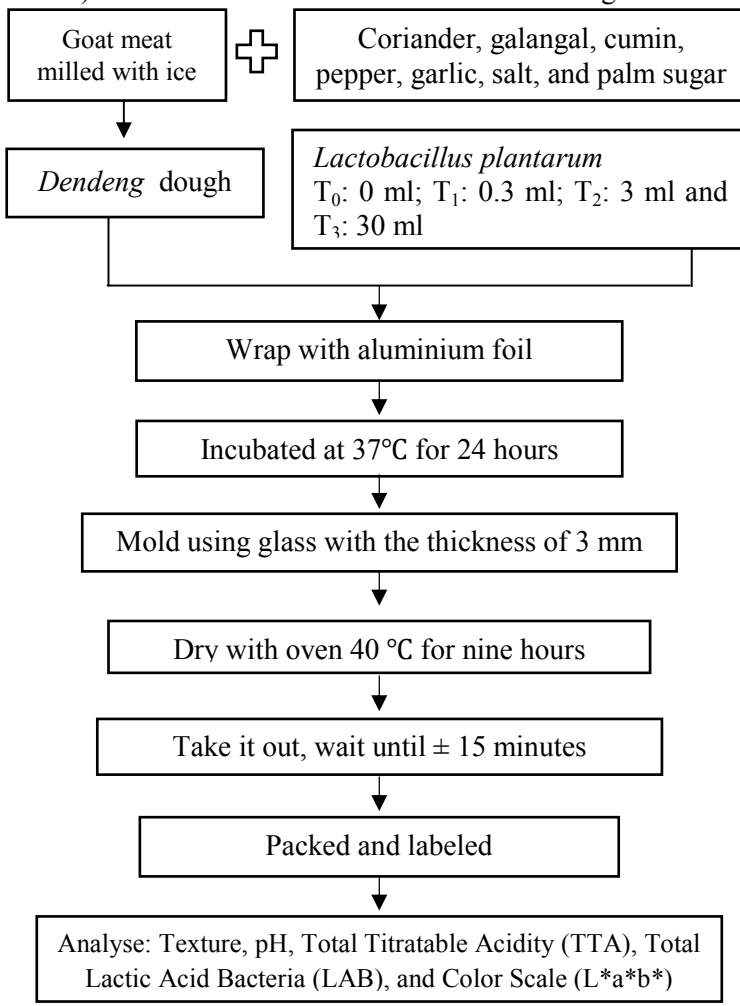

Figure 3. Flowchart of Fermented Goat *Dendeng*de Macedo, Pflanzer, and Gomes (2012) with modification

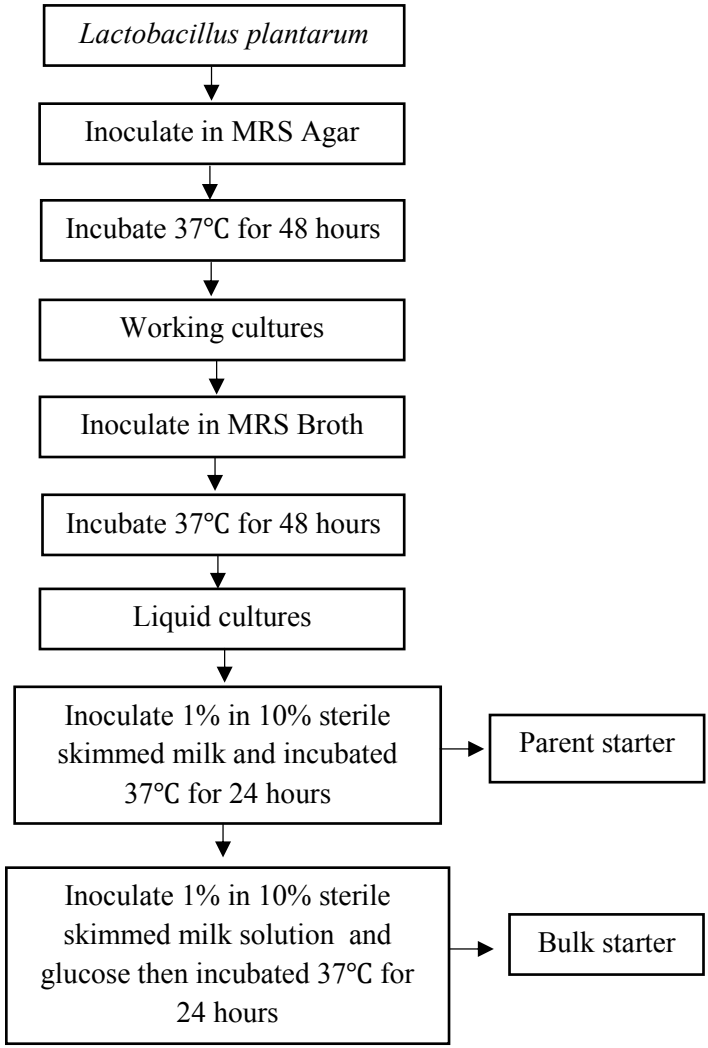

Figure 4. Propagation of *Lactobacillus Plantarum*
(Setioningsih, Setyaningsih, and Susilowati, 2004)

3.3.1.3 Variable Observed

The variables of this research were the analysis of Texture, pH, Total Titratable Acidity (TTA), Total Lactic Acid Bacteria (LAB), and Color Scale (L*a*b*). The procedure analysis of all variable shown in Appendix 1 – 5.

3.3.1.4 Data Analysis

The data from this research tabulated with Microsoft Excel and statistical analysis that used was ANOVA (Analysis of Variance). If the data obtained significant difference, it will be followed to DMRT (Duncan Multiple Range Test).

The Completely Randomized Design mathematical model is:

$$Y_{ij} = \mu + \tau_i + \varepsilon_{ij}$$

Notes: Y_{ij} = observation of the main factors
μ = general average
τ_i = primary effect on level to-i
ε_{ij} = influence of error
I = 1, 2, 3, 4.....a
J = 1, 2, 3, 4.....u

3.3.1.5 Terminology

Goat Meat : meat that has a paler color that goat meat (mutton) and has white color on the fat part

Dendeng : slashed or ground meat, seasoned with spices, and dried with sunlight or low heat.

Lactobacillus plantarum	:	homofermentative bacteria that can be able to break down complex compound into simple compound with the result is lactic acid.
pH Analysis	:	a quantitative measure of the acidity or basicity of aqueous or other liquid solutions.
Texture Analysis	:	an analytical method that could quantify multiple textural parameters or identify the texture of the product with a target hardness, etc.
L*a*b* Color Scale	:	describes mathematically all perceivable colors in the dimensions L* for lightness, a* for green-red and b* for blue-yellow.
Total of Titratable Acidity (TTA)	:	the total concentration of free protons and undissociated acids in a solution that can react with a strong base and neutralized.